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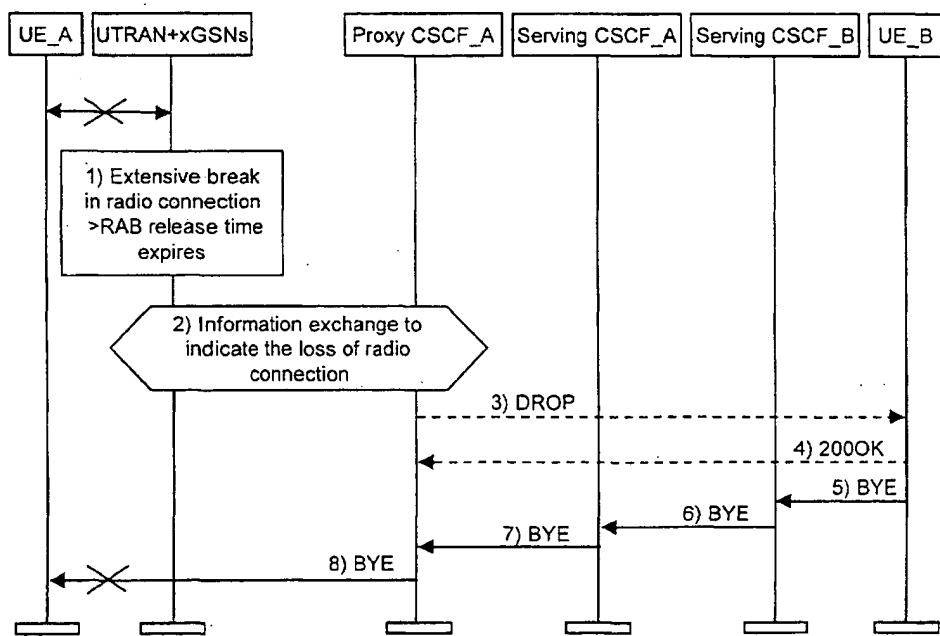
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(54) Title: CLOSING A SIP ACTIVE SESSION



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(57) Abstract: A method and a system for closing a SIP active session in a communication network system are disclosed, in which a request indicating a drop of connection is issued by a control network element towards an endpoint of the session, for initiating the closing of the active session, and a BYE request is issued by said endpoint towards the other endpoints of the session upon receiving said request indicating a drop of connection.



*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

TITLE OF THE INVENTION

CLOSING A SIP ACTIVE SESSION

5 FIELD OF THE INVENTION

The present invention relates to closing a SIP active session in a communication network system.

10 BACKGROUND OF THE INVENTION

The Session Initiation Protocol (SIP) is an application layer control (signaling) protocol that can establish, modify and terminate multimedia sessions or calls. These multimedia sessions include multimedia conferences, distance learning, Internet telephony and similar applications. SIP can invite both persons and "robots", such as a media storage device. SIP can invite parties to both unicast and multicast sessions. The initiator does not necessarily have to be a member of the session to which it is inviting. Media and participants can be added to an existing session.

In standard SIP, active sessions can only be closed by the endpoints of a session by issuing a BYE request. The BYE request is used by the endpoint to indicate to a server that it wishes to release the call. The BYE request is forwarded like an INVITE request and may be issued by either caller or callee. A party receiving a BYE request must cease transmitting media streams specifically directed at the party issuing the BYE request.

According to the 3GPP (3<sup>rd</sup> Generation Partnership Project) architecture, control network elements like Call State Control Functions (CSCFs) or Media Gateway Control Functions (MGCFs) have complete control over the session related service execution, and may also have control over the usage

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of GPRS (General Packet Radio Service) bearer resources for IM (Internet Protocol Multimedia) Subsystem calls.

SUMMARY OF THE INVENTION

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It is therefore an object of the present invention to enable control network elements to close SIP active sessions.

According to an aspect of the present invention, this object  
10 is achieved by a method of closing a SIP active session in a communication network system, said method comprising the steps issuing a request indicating a drop of connection by a control network element towards an endpoint of the session, for initiating the closing of the active session, and issuing  
15 a BYE request by the endpoint towards the other endpoints of the session upon receiving the request indicating a drop of connection.

According to another aspect of the present invention, the  
20 object is achieved by a communication network system comprising a control network element for issuing a request indicating a drop of connection towards an endpoint of a SIP active session, for initiating the closing of said active session, wherein the endpoint issues a BYE request towards  
25 the other endpoints of the session upon receiving the request indicating a drop of connection.

The BYE request issued by the endpoint will trigger the closing of the session along the call path. The endpoint may  
30 also issue an acknowledge response towards the control network element upon receiving the request indicating a drop of connection.

According to an embodiment of the present invention, when  
35 receiving, by the control network element, information indicating a need for closing the active session, the request

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indicating a drop of connection is issued as a response to said received information. The control network element determines which endpoint is the cause of the closing of the session on the basis of the received information, and issues  
5 the request indicating a drop of connection towards an endpoint that is not the cause of the closing of the session.

According to another embodiment of the present invention, the control network element executes a service for an endpoint,  
10 resulting in an instruction to close the active session, and issues the request indicating a drop of connection as a response to the instruction towards another endpoint of the session.  
  
15 The request indicating a drop of connection may comprise To, From and Call\_ID headers which are identical to those of an original INVITE request for the session. Moreover, in the issued BYE request, the session to be closed may be identified by the To, From and Call\_ID headers of the request  
20 indicating a drop of connection.

The request indicating a drop of connection and its response may travel on a path different from the path of an original INVITE request for the session.

25 Furthermore, the above-mentioned object is achieved by a control network element in a communication network system, the control network element being adapted to issue a request indicating a drop of connection towards an endpoint of a SIP  
30 active session, for initiating the closing of the active session by causing a BYE request to be issued by the endpoint towards the other endpoints of the session upon receiving the request indicating a drop of connection.  
  
35 The control network element is adapted to receive an acknowledge response issued by the endpoint towards the

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control network element upon receiving the request indicating a drop of connection.

According to an embodiment of the present invention, the  
5 control network element is adapted to receive information  
indicating a need for closing the active session, and to  
issue the request indicating a drop of connection as a  
response to the received information. The control network  
element is further adapted to determine which endpoint is the  
10 cause of the closing of the session on the basis of the  
received information, and to issue said request indicating a  
drop of connection towards an endpoint that is not the cause  
of the closing of the session. The control network element  
may perform call control for the endpoint being the cause of  
15 the closing of the session.

According to another embodiment of the present invention, the  
control network element is adapted to execute a service for  
an endpoint resulting in an instruction to close the active  
20 session, and to issue the request indicating a drop of  
connection as a response to the instruction towards another  
endpoint of the session.

In addition, the above-mentioned object is achieved by a user  
25 equipment in a communication network system, wherein the user  
equipment is adapted to receive, in a SIP active session, a  
request indicating a drop of connection for initiating the  
closing of the active session, and to issue a BYE request  
towards other endpoints of the session upon receiving the  
30 request indicating a drop of connection.

The user equipment is further adapted to issue an acknowledge  
response towards a control network element upon receiving the  
request indicating a drop of connection from the control  
35 network element.

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According to the present invention, CSCFs and MGCFs are enabled to close SIP active sessions if required. A need to interrupt a SIP connection may arise when a party involved in the SIP session is out-of-coverage, or as a result of a 5 service execution, e.g. running out of prepaid credit.

In the following the present invention will be described by way of preferred embodiments thereof with reference to the accompanying drawings.

10

#### BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 shows a signaling diagram according to an embodiment 15 of the present invention, when a sudden loss of radio connection occurs.

Fig. 2 shows a signaling diagram according to another embodiment of the present invention, when an executed service results in an instruction to immediately close the session.

20

#### DESCRIPTION OF THE PREFERRED EMBODIMENTS

The idea of the present invention is to introduce a new SIP method to be used by a control entity like CSCF or MGCF in a 25 communication network system to close active sessions.

The entity performing call/service control, e.g. CSCF or MGCF, may initiate to close a SIP active session by issuing a request indicating a drop of connection (which is hereinafter 30 called DROP request) towards one of the endpoints of the session. Preferably, the DROP request should be sent to the endpoint which was not the cause of the sudden closing of the session. The To, From and Call\_ID headers of the DROP request should be identical to those of the original INVITE request 35 for the session. The DROP request and its response may travel on a different path than that the original INVITE request of

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the session has taken. The endpoint receiving the DROP request should acknowledge the request with a 200OK response, and immediately issue a BYE request towards the other endpoint(s) of the session. This BYE request and, if 5 possible, its response will trigger the closing of the session along the call path.

Fig. 1 shows a signaling diagram according to an embodiment of the present invention, when a User Equipment UE\_A suddenly 10 looses radio connection. When the Radio Access Bearer (RAB) release timer in the Radio Network Controller (RNC) expires (block 1) in Fig. 1), this event is communicated to a Proxy-CSCF\_A performing call control for the UE\_A (communications 2) in Fig. 1). As a result, the Proxy-CSCF\_A initiates the 15 closing of the IM Subsystem Session. Therefore, it issues a DROP request towards a User Equipment UE\_B as participant of the session (communication 3) in Fig. 1). The UE\_B acknowledges the DROP request with a 200OK response (communication 4) in Fig. 1), and issues a BYE request to 20 close the session that corresponds to the session identified by the {From, To Call\_ID} triple in the DROP request. As it shown in Fig. 1, the UE\_B issues the BYE request to a Serving-CSCF\_B performing service control for UE\_B (communication 5)). The Serving-CSCF\_B forwards the BYE 25 request to the Serving CSCF\_A performing service control for UE\_A (communication 6)), and the Serving-CSCF\_A forwards the BYE request to the Proxy-CSCF\_A (communication 7)). Finally, the Proxy-CSCF\_A forwards the BYE request to the UE\_A (communication 8)), which, however, will not reach the UE\_A 30 since the UE\_A has lost radio connection towards the Universal Terrestrial Radio Access Network (UTRAN). The BYE requests 5) to 8) in Fig. 1 trigger the closing of the session along the call path.

35 Fig. 2 shows a signaling diagram according to another embodiment of the present invention, when a service executed

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for a User Equipment UE\_A results in an instruction to immediately close the session. In this embodiment, a service is executed for the UE\_A in the active phase of a session comprising the participants UE\_A and UE\_B (block 1) in Fig. 5 2) by a Serving-CSCF\_A performing service control for the UE\_A. This service results in the instruction to immediately close the session (block 2) in Fig. 2) because the UE\_A is running out of pre-paid credit, for example. Therefore, the Serving-CSCF\_A issues a DROP request towards the UE\_B 10 (communication 3) in Fig. 2). The UE\_B acknowledges the DROP request with a 200OK response message (communication 4) in Fig. 2), and issues a BYE request to the Serving-CSCF\_B (communication 5) in Fig. 2) to close the session that corresponds to the session identified by the {From, To, 15 Call\_ID} triple in the DROP request. The Serving-CSCF\_B forwards the BYE request to the Serving-CSCF\_A (communication 6) in Fig. 2), and the Serving-CSCF\_A forwards the BYE request to the UE\_A (communication 7) in Fig. 2). In the following communications 8) to 10) in Fig. 2, the respective 20 BYE requests are acknowledged by 200OK response messages.

The above described SIP method and in particular the DROP request can be implemented as an extension to the standard SIP stack in CSCFs and MGCFs. [REDACTED]

25 While the invention has been described with reference to preferred embodiments, the description is illustrative of the invention and is not to be construed as limiting the invention. Various modifications and applications may occur 30 to those skilled in the art without departing from the true spirit and scope of the invention as defined by the appended claims.

CLAIMS:

1. A method of closing a SIP active session in a communication network system, said method comprising the 5 steps of:

issuing a request indicating a drop of connection by a control network element towards an endpoint of the session, for initiating the closing of the active session; and

10 issuing a BYE request by said endpoint towards the other endpoints of the session upon receiving said request indicating a drop of connection.

2. A method according to claim 1, wherein said BYE request triggers the closing of the session along the call path.

15

3. A method according to claim 1 or 2, comprising the further step of:

issuing an acknowledge response by said endpoint towards said control network element upon receiving said request 20 indicating a drop of connection.

4. A method according to any one of claims 1 to 3, comprising the further step of:

receiving, by said control network element, information 25 indicating a need for closing the active session, wherein said request indicating a drop of connection is issued as a response to said received information.

5. A method according to claim 4, comprising the further step 30 of:

determining which endpoint is the cause of the closing of the session on the basis of the received information, wherein

35 said request indicating a drop of connection is issued towards an endpoint that is not the cause of the closing of the session.

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6. A method according to any one of claims 1 to 3, comprising the further step of:

executing a service for an endpoint by said control  
5 network element, resulting in an instruction to close the active session, wherein

said request indicating a drop of connection is issued as a response to said instruction towards another endpoint of the session.

10

7. A method according to any one of the preceding claims, wherein said request indicating a drop of connection comprises To, From and Call\_ID headers which are identical to those of an original INVITE request for the session.

15

8. A method according to claim 7, wherein in the issued BYE request the session to be closed is identified by the To, From and Call\_ID headers of the request indicating a drop of connection.

20

9. A method according to claim 3, wherein said request indicating a drop of connection and its response travel on a path different from the path of an original INVITE request for the session.

25

10. A communication network system comprising:

a control network element for issuing a request indicating a drop of connection towards an endpoint of a SIP active session, for initiating the closing of said active  
30 session, wherein

said endpoint issues a BYE request towards the other endpoints of the session upon receiving said request indicating a drop of connection.

35 11. A system according to claim 10, wherein said BYE request triggers the closing of the session along the call path.

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12. A system according to claim 10 or 11, wherein  
said endpoint issues an acknowledge response towards  
said control network element upon receiving said request  
5 indicating a drop of connection.

13. A system according to any one of claims 10 to 12,  
wherein, when said control network element receives  
information indicating a need for closing the active session,  
10 said control network element issues said request indicating a  
drop of connection as a response to said received  
information.

14. A system according to claim 13, wherein said control  
15 network element determines which endpoint is the cause of the  
closing of the session on the basis of the received  
information, and issues said request indicating a drop of  
connection towards an endpoint that is not the cause of the  
closing of the session.

20

15. A system according to any one of claims 10 to 12,  
wherein, when said control network element executes a service  
for an endpoint resulting in an instruction to close the  
active session, said control network element issues said  
25 request indicating a drop of connection as a response to said  
instruction towards another endpoint of the session.

16. A system according to any one of claims 10 to 15, wherein  
said request indicating a drop of connection comprises To,  
30 From and Call\_ID headers which are identical to those of an  
original INVITE request for the session.

17. A system according to claim 16, wherein in the issued BYE  
request the session to be closed is identified by the To,  
35 From and Call\_ID headers of the request indicating a drop of  
connection.

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18. A system according to claim 12, wherein said request indicating a drop of connection and its response travel on a path different from the path of an original INVITE request  
5 for the session.

19. A control network element in a communication network system, wherein

said control network element is adapted to issue a  
10 request indicating a drop of connection towards an endpoint of a SIP active session, for initiating the closing of said active session by causing a BYE request to be issued by said endpoint towards the other endpoints of the session upon receiving said request indicating a drop of connection.

15

20. A control network element according to claim 19, wherein said BYE request triggers the closing of the session along the call path.

20 21. A control network element according to claim 19 or 20, wherein

said control network element is adapted to receive an acknowledge response issued by said endpoint towards said control network element upon receiving said request  
25 indicating a drop of connection.

22. A control network element according to any one of claims 19 to 21, wherein said control network element is adapted to receive information indicating a need for closing the active  
30 session, and to issue said request indicating a drop of connection as a response to said received information.

23. A control network element according to claim 22, wherein said control network element is adapted to determine which  
35 endpoint is the cause of the closing of the session on the basis of the received information, and to issue said request

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indicating a drop of connection towards an endpoint that is not the cause of the closing of the session.

24. A control network element according to claim 23, wherein  
5 said control network element performs call control for the endpoint being the cause of the closing of the session.

25. A control network element according to any one of claims 19 to 21, wherein said control network element is adapted to 10 execute a service for an endpoint resulting in an instruction to close the active session, and to issue said request indicating a drop of connection as a response to said instruction towards another endpoint of the session.

15 26. A control network element according to any one of claims 19 to 25, wherein said request indicating a drop of connection comprises To, From and Call\_ID headers which are identical to those of an original INVITE request for the session.

20 27. A user equipment in a communication network system, wherein said user equipment is adapted to receive, in a SIP active session, a request indicating a drop of connection for initiating the closing of said active session, and to issue a 25 BYE request towards other endpoints of the session upon receiving said request indicating a drop of connection.

28. A user equipment according to claim 27, wherein said BYE request triggers the closing of the session along the call 30 path.

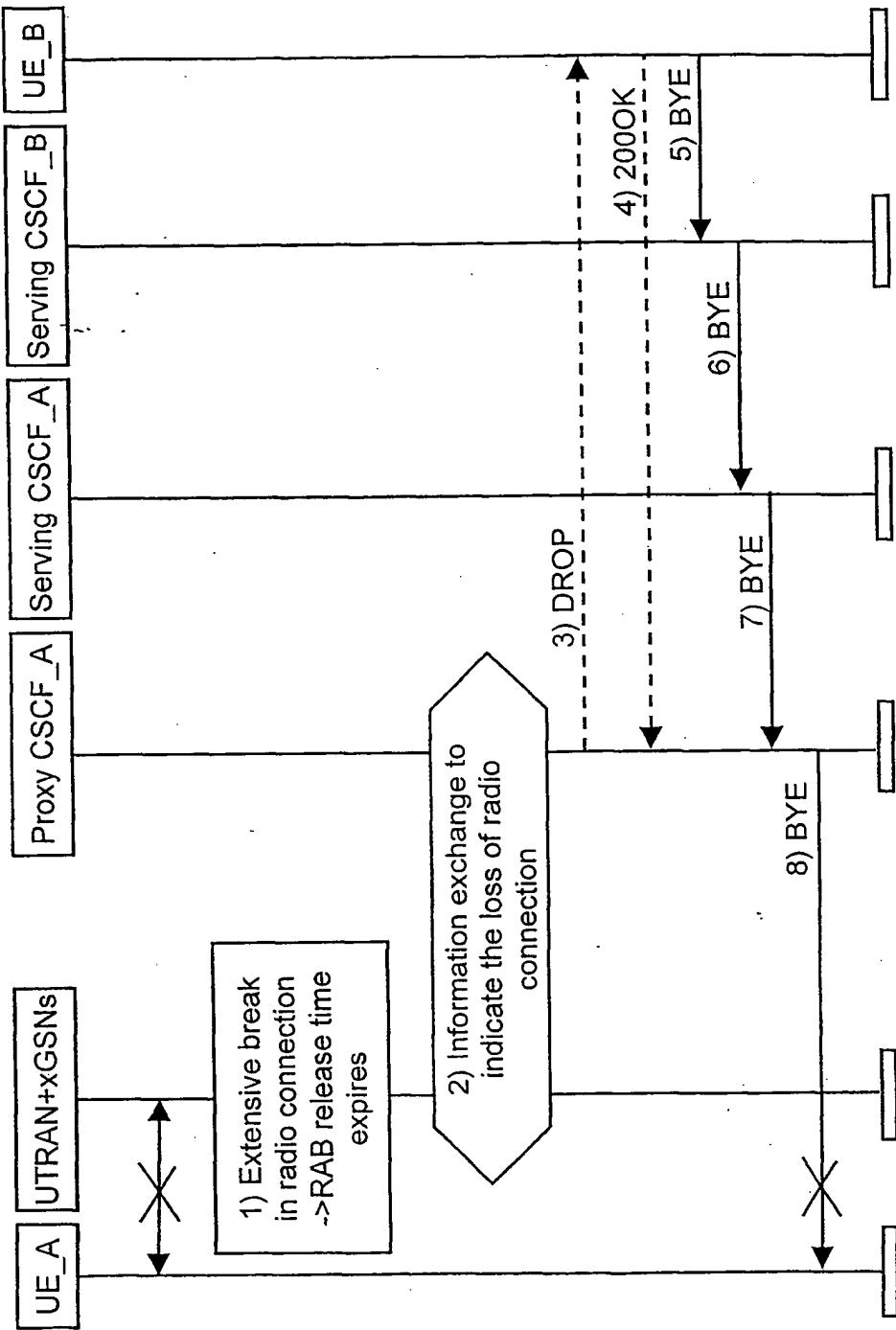
29. A user equipment according to claim 27 or 28, wherein said user equipment is adapted to issue an acknowledge response towards a control network element upon receiving 35 said request indicating a drop of connection from said control network element.

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30. A user equipment according to any one of claims 27 to 29,  
wherein said request indicating a drop of connection  
comprises To, From and Call\_ID headers which are identical to  
5 those of an original INVITE request for the session.

31. A user equipment according to claim 30, wherein in the  
issued BYE request the session to be closed is identified by  
the To, From and Call\_ID headers of the request indicating a  
10 drop of connection.

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**Fig. 1**

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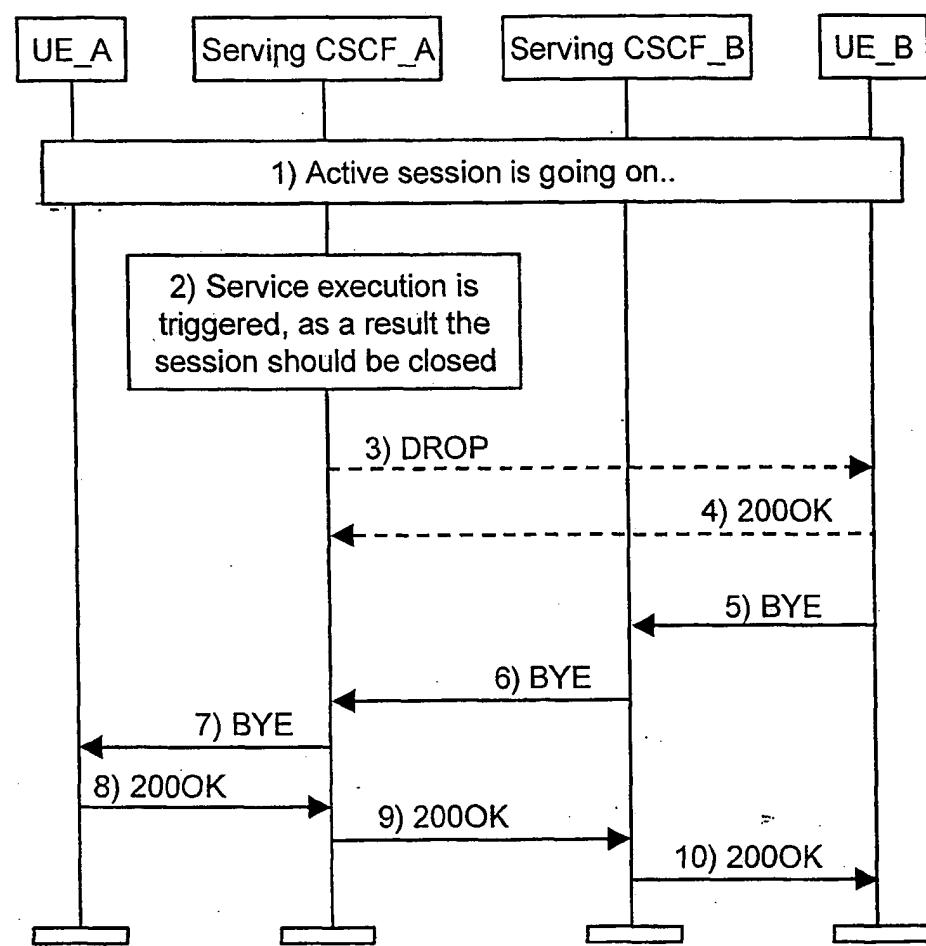


Fig. 2

## INTERNATIONAL SEARCH REPORT

International Application No  
PCT/EP 01/01849

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 7 H04L29/06

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 H04L H04M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, IBM-TDB, INSPEC, COMPENDEX

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	MOH M ET AL: "Mobile IP telephony: mobility support of SIP" PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON COMPUTER COMMUNICATIONS AND NETWORKS, XX, XX, 11 October 1999 (1999-10-11), pages 554-559, XP002143545 page 558, left-hand column, line 6-47 figure 2 --- WO 00 79756 A (ERICSSON TELEFON AB L M) 28 December 2000 (2000-12-28) page 11, line 19-23 page 24, line 19-27 page 25, line 9-14 figures 2,8D ---	1-31
A	---	1-31

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

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## INTERNATIONAL SEARCH REPORT

International Application No  
PCT/EP 01/01849

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 00 77992 A (MCIWORLDCOM INC) 21 December 2000 (2000-12-21) page 11, line 33 -page 12, line 12 figures 2,6 -----	1-31

## INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 01/01849

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			AU	5862500 A		09-01-2001
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WO 0077992	A	21-12-2000	AU	5453700 A		02-01-2001
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